~~DRAFT~~ QUARTERLY RESOURCE CONSERVATION AND RECOVERY ACT GROUNDWATER MONITORING DATA FOR THE PERIOD APRIL THROUGH JUNE, 2004.

Sixteen *Resource Conservation and Recovery Act of 1976* (RCRA) sites[1] were sampled during the reporting quarter, as listed in Table 1. Sampled sites include eight monitored under groundwater indicator evaluation ("detection") programs [40 CFR 265.93(b)], seven monitored under groundwater quality assessment programs [40 CFR 265.93(d)], and one monitored under a final-status groundwater corrective action program [WAC 173-303-645(11)].

DOE asserts that pursuant to the *Atomic Energy Act of 1954* (AEA), it has sole and exclusive responsibility and authority to regulate source, special nuclear and by-product materials at DOE-owned nuclear facilities. DOE further asserts that source, special nuclear and by-product materials as defined by AEA are not subject to regulation by the State of Washington and are not subject to State permit, license, order, or any other enforceable instrument thereof. DOE recognizes that radionuclide data are useful in the development and confirmation of geohydrologic conceptual models of the hydrologic flow system including, but not limited to, the rate and direction of groundwater flow, discrimination of the source of contaminant plumes in areas of multiple potential contamination sources, recharge mechanisms and rates to groundwater, and the performance of corrective measures. Radionuclide data contained herein are provided so that all information available may be used for such purposes.

Comparison to Concentration Limits

Contamination indicator parameter data (pH, specific conductance, total organic halides, and total organic carbon) from downgradient wells were compared to background values at sites monitored under detection requirements, as described in 40 CFR 265.93. Results of the comparisons are listed in Table 1. Additional explanation, if needed, is provided below.

216-A-29 Ditch: The average value of specific conductance in downgradient wells 299-E25-35 (385.5 μS/cm) and 299-E25-48 (431 μS/cm) continued to exceed the critical mean value of 271 μS/cm in April 2004. Average specific conductance in downgradient well 299-E26-13 in April (272 uS/cm) also exceeded the critical mean value. Specific conductance has been gradually increasing in this well since 1997. Previous exceedances were reported earlier and the rise in specific conductance has been attributed to non-hazardous constituents sulfate, calcium, and sodium (Thompson, 2000). No further action is necessary.

216-B-63 Trench: The average value of pH in downgradient wells 299-E33-36 (8.59) and 299-E34-8 (8.37) exceeded the upper limit of critical range [7.76, 8.36] in May 2004. The pH values were consistent with historical data so verification sampling is not necessary. The pH critical range was updated for fiscal year 2004 comparisons based on recent results from five upgradient wells, and the upgradient data are less variable than previous data (making the critical range narrower). Because the exceedance does not indicate a release from the facility, detection monitoring will continue.

The average value for total organic carbon in well 299-E33-37 (1,450 μg/L) exceeded the critical mean value (1,360 μg/L) and limit of quantitation (1,370 μg/L) in April 2004. The recent result was a significant increase from previous results. For example, in April and October 2003, results were undetected (<390 μg/L and <140 μg/L respectively). Results of the October 2004 sampling will be used to confirm or refute the April 2004 results.

[1] A site is a Treatment, Storage, and/or Disposal (TSD) unit or a waste management area associated with a TSD unit.

Table 1. Status of RCRA Sites April-June, 2004.

Site	Routine sampling?	DG Statistical exceedance?	Comments
Indicator Evaluation Sites [40 CFR 265.93(b)] (sampled semiannually)			
1301-N Liquid Waste Disposal Facility	No	Not sampled	
1325-N Liquid Waste Disposal Facility	No	Not sampled	
1324-N/NA Facilities	No	Not sampled	
216-B-3 Pond	No	Not sampled	
216-A-29 Ditch	Yes	Yes[a]	See text.
216-B-63 Trench	Yes	Yes	Specific conductance[a] and TOC. See text.
216-S-10 Pond and Ditch	Yes	No	Current network 2 shallow and 1 deep DG wells[(b)]
LERF	Yes	See comment	No statistical evaluation per Ecology.
LLWMA 1	Yes	Yes[a]	See text.
LLWMA 2	Yes	Yes[a]	See text. Wells monitoring the north part of the LLWMA are dry[(b)].
LLWMA 3	No	Not sampled	See text for results of confirmation sampling and reanalysis. 12 of 20 wells in original network are dry[(b)]
LLWMA 4	No	Not sampled	Current network 3 UG, 1 DG well [(b)].
SST WMA A-AX	Yes	No	See text for results of confirmation sampling for earlier exceedance.
SST WMA C	Yes	See comment	Sampled quarterly. No statistical evaluation until 4 quarters stable data from UG well.
NRDWL	No	Not sampled	
Groundwater Quality Assessment Sites [40 CFR 265.93(d)] (sampled quarterly)			
Seven sites[c]	Yes	Not required	See updates in text.
Final Status Sites [WAC 173-303-645(11)]			
300 Area Process Trenches	Yes	Yes[d]	
183-H Solar Evaporation Basins	No	Not sampled	

CM = Critical mean value(s)
DG = Downgradient
LERF = Liquid Effluent Retention Facility
LLWMA = Low-Level WMA
NRDWL = Nonradioactive Dangerous Waste Landfill SST = Single-Shell Tanks
UG = upgradient
WMA = Waste Management Area

[a] No indication of dangerous waste contamination from facility; see text for explanation.
[b] Well installation needs are addressed each year as part of the M-24 milestone process.
[c] U-12 Crib, PUREX Cribs, SST WMAs B-BX-BY, S-SX, T, TX-TY, and U.
[d] Site has entered corrective action monitoring because of previous exceedances.

Low-Level Waste Management Area 1: The average value of specific conductance in downgradient well 299-E33-34 (1,249.5 μS/cm) and adjacent well 299-E32-10 (694.5 μS/cm) exceeded the critical mean of 687 μS/cm in June 2004. Previous exceedances in these wells were reported earlier. Nitrate, sulfate, calcium, and sodium are all elevated in well and 299-E33-34 follow a pattern similar to specific conductance. An assessment report was submitted to Ecology earlier (Furman, 1999). Because no waste has been placed in the northern portion of this waste management area and there is a known nitrate plume from an upgradient source, detection monitoring will continue.

Low-Level Waste Management Area 2: During the April 2004 sampling, average results of specific conductance (1,917 μS/cm), total organic carbon (~3,700 μg/L) and total organic halides (~15.6 μg/L) in upgradient well 299-E34-7 continued to exceed their critical mean values (1,431 μS/cm, 3,470 μg/L, and 15.4 μg/L respectively). The rise in specific conductance is attributable mainly to sulfate, calcium, chloride, and nitrate. Contributors to the elevated total organic carbon and total organic halides are under investigation. This well has been sampled for an extensive list of Appendix IX waste and other constituents. Oil and grease was reported in one of two duplicates at 1.2 mg/L but was not detected in the other sample. Trace levels of several organic compounds were reported in the April 2004 sample and duplicate sample. The levels reported are far lower than the total organic carbon and total organic halide levels so they do not account for the indicator parameter results. In some cases contamination was found in the corresponding blank (dioxins and bromomethane). Chloromethane and di-n-octylphthalate were reported in one sample but not detected in the duplicate. Di-n-octylphthalate is considered to be a common laboratory contaminant. Because the exceedances occurred in an upgradient well, the site remains in detection monitoring.

Low-Level Waste Management Area 3. Downgradient well 299-W7-12 was sampled in April, delayed from its scheduled sampling in March. The average of the results for TOC (1,500 μg/L) exceeded the critical mean value (1,370 μg/L). The samples were reanalyzed and results were much lower (average = 450 μg/L). Confirmation sampling was performed in June and results from two laboratories confirmed that TOC concentrations remain low in this well. The erroneous values in the HEIS database were replaced with the results from the reanalyzed samples.

Single-Shell Tank WMA A-AX: In December 2003, data reported for the new downgradient well, 299-E25-93, showed high levels of contamination. Total organic carbon (TOC) data averaged over four duplicate samples was 3,600 μg/L, well over the critical mean of 2,360 μg/L for this site. Verification sampling was conducted in March 2004. Results from verification sampling for TOC averaged 1,700 μg/L, which is below the critical mean for this site. However, the verification result was above the limit of quantitation of 1,370 μg/L, and thus indicates that TOC is elevated in the groundwater. Results from the June 2004 sampling of well 299-E25-93 averaged 433 μg/L. The site will remain in a detection monitoring program. Because the groundwater at this downgradient well is also elevated in nitrate (55.8 mg/L) and technetium-99 (13,000 pCi/L), sampling frequency in this well was increased to quarterly for this year, beginning with the June 2004 sampling event.

Wells Not Sampled as Scheduled

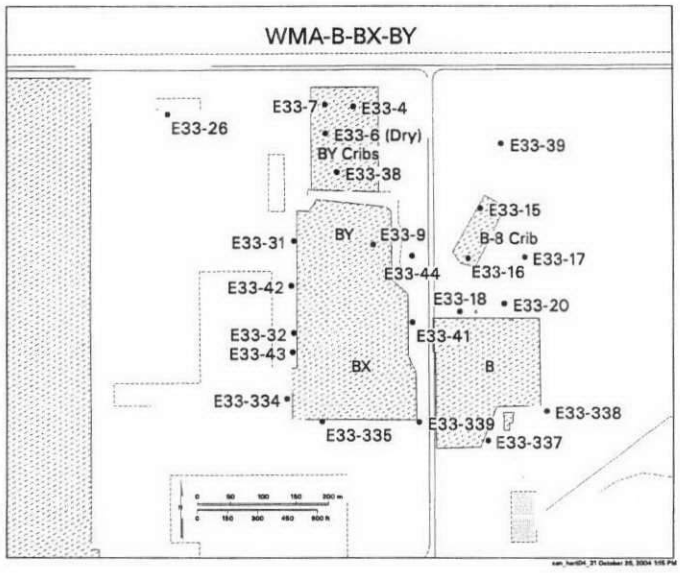
The wells listed in Table 2 were not sampled as scheduled. Wells that were delayed from their original sampling date are listed only if the successful sample date was beyond the end of the reporting quarter. The table does not include wells that were reported dry in previous quarterly or annual reports.

Table 2. Wells Not Sampled as Scheduled During the Reporting Period.

Well	RCRA Site	Date Scheduled	Date Sampled	Comment
299-E24-19	WMA A-AX	None	--	Cancelled; casing corroded.
299-E25-46	WMA A-AX	None	--	Cancelled; casing corroded.
299-E33-9	WMA B-BX-BY	05/2004	--	In tank farm; safety restrictions.
299-W14-5	WMA TX-TY	05/2004	05/28/2004	Samples collected, but water level was below the perforated interval. Samples nonrepresentative. Well considered dry.

Status of Assessment Programs

This section describes the seven RCRA sites currently monitored under groundwater quality assessment.



Single-Shell Tanks Waste Management Area B-BX-BY: Based on in situ measurements, the groundwater is nearly stagnant in the north part of the waste management area, flowing slowly to the west southwest. Along the south, it appears to flows towards the south to southeast with a faster flow rate. The water level at the WMA has dropped about 2.5 inches this last quarter. One well under the BY Cribs, 299-E33-6, is dry down to the basalt, while the aquifer just to the east is only 1.5 feet thick. This indicates that the northern edge of the aquifer is beginning to impinge on this area.

In general, nitrate trends remained steady or showed small increases. For example, the nitrate concentration changed from 266 mg/L to 268 mg/L from February 2004 to May 2004 in well 299-E33-44, located east of the BY Tank Farm. North of the B Tank Farm, the nitrate concentrations are beginning to increase, changing from 514 to 558 mg/L over the same time period in well 299-E33-16. An old carbon steel well (299-E33-4) was sampled in June 2004 to determine local variations in concentrations within the BY Cribs prior to decommissioning. A nitrate concentration of 1,070 mg/L was found in this well, which is distinctly greater than nearby well 299-E33-7 at 660 mg/L. This is the highest nitrate value seen in the region since contamination began to rise again in the early 1990s. Unfortunately the record for most non-radioactive constituents in the area dates back to the late 1980s, not covering the time when the surrounding waste disposal facilities were in use.

The technetium-99 in well 299-E33-4 is 11,000 pCi/L, currently the greatest value around the WMA. Other close wells have values ranging from 10,200 to 10,400 pCi/L. In the central part of the WMA, close to the center of the uranium plume, the general technetium-99 trend is sharply increasing, having changed from 4,270 pCi/L in August 2003 to 7,420 pCi/L in May 2004. Well 299-E33-39, an upgradient well, usually marks the northeast extent of contamination in the area. However, technetium-99 has been rising steadily from barely detectable in May 1999 to 150 pCi/L in May 2004. Nitrate has risen from 17.7

mg/L to 52.7 mg/L over the same time period. This increase reflects the high concentration observed to the north along the subcrop in the early 1990s. As the aquifer recedes, this contamination is now impinging on this well.

Although the center of a uranium plume is found under the 241-BY Tank Farm, the key well, 299-E33-9, can not currently be sampled because of safety restrictions on operations within the tank farms. It is not known, at this time, when sampling in this well will resume. The well was last sampled in March 2004 when the uranium level was rising, to 590 µg/L from a low of 314 µg/L seen in May 2002. Outside the farm on the east side, uranium levels have risen from 81 to 133 µg/L (well 299-E33-31) during the last quarter and from 327 to 350 µg/L on the west side (well 299-E33-44). To the south in well 299-E33-18 and to the north in well 299-E33-38, uranium continued to increase as shown in Figure 1, ranging from 254 to 337 µg/L in the two wells. Uranium was not found above background levels in well 299-E33-4, which is located north of well 299-E33-38.

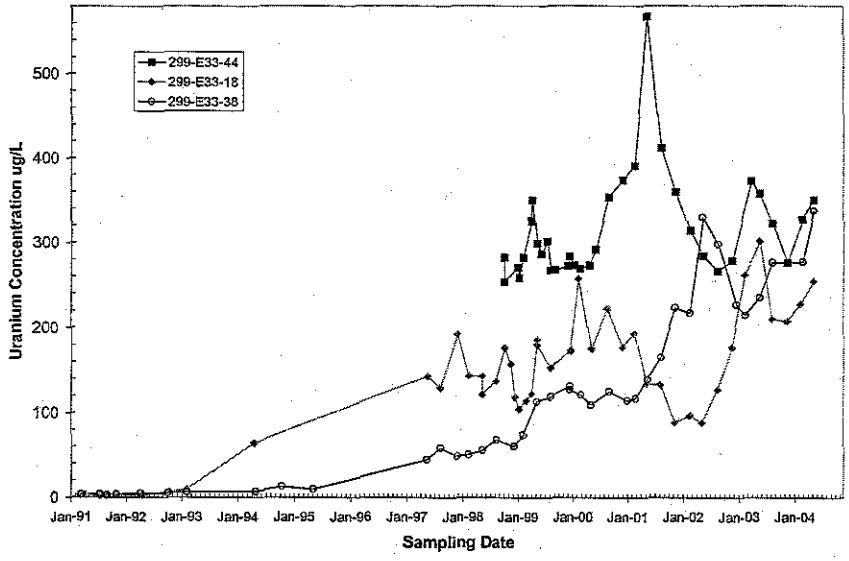
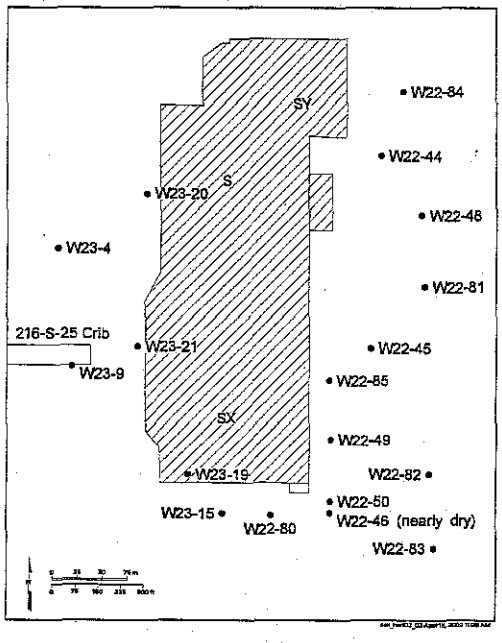


Figure 1. Uranium in Wells 299-E33-44, 299-E33-18, and 299-E33-38.

Single-Shell Tank Waste Management Area S-SX: Groundwater beneath this site is contaminated with hexavalent chromium, nitrate, and technetium-99 attributed to two general source areas within the WMA. In addition, tritium and carbon tetrachloride are present in groundwater beneath the WMA, but their sources are from adjacent facilities. All analytical results from groundwater samples collected during the quarter were on trend.

The water table has continued to decline at a steady rate of approximately 0.3 meter per year; the gradient and flow direction are stable with the interpreted flow direction to the east. All water levels measured during the quarter were consistent with the falling water table trend with the exception of one result that was considered erroneous and the datum was flagged to note that the value is considered suspect.



The northern contaminant plume, with an apparent source in S Tank Farm and passing through wells 299-W22-44, 299-W22-48, and 299-W22-81 appears to be on a downward trend for chromium, nitrate, and technetium-99 where concentrations for all three have continued to drop in well 299-W22-48 as seen in Figure 2. The plume continues to spread to the north as indicated by the increasing nitrate and technetium-99 concentrations in well 299-W22-44, located approximately 60 meters north of well 299-W22-48, where both constituents are just above their respective drinking water standards.

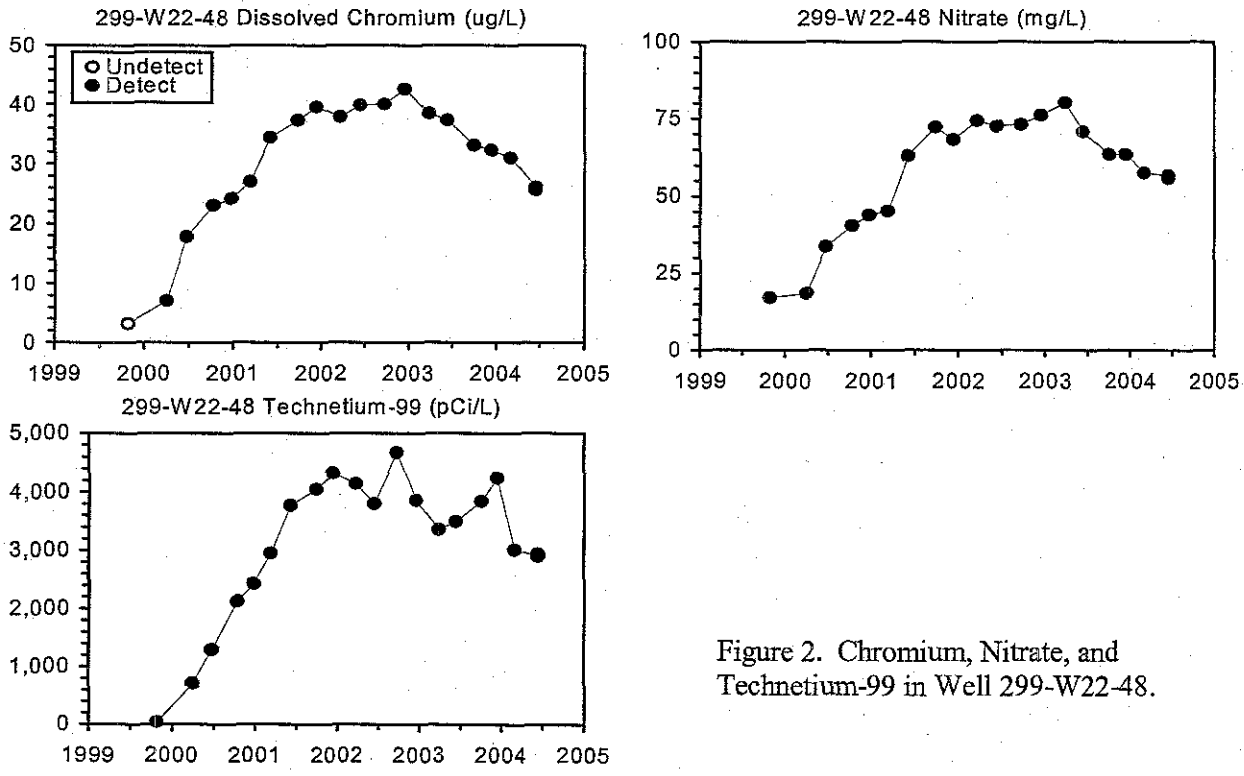


Figure 2. Chromium, Nitrate, and Technetium-99 in Well 299-W22-48.

The contaminant plume migrating from the SX Tank Farm in the southern portion of the WMA continues to spread slowly downgradient. This plume comprises chromium, nitrate, and technetium-99, just as the S Tank Farm plume to the north. Chromium concentrations in the source area (represented by well 299-W23-19) have continued to rise since the first half of 2002 (see Figure 3). At 201 μg/L in June 2004, the chromium concentration in the source area is now twice the 100 μg/L drinking water standard. As reported in previous reports, chromium concentrations have been increasing in the source area while nitrate and technetium-99 (see Figure 3) have been decreasing or remaining stable.

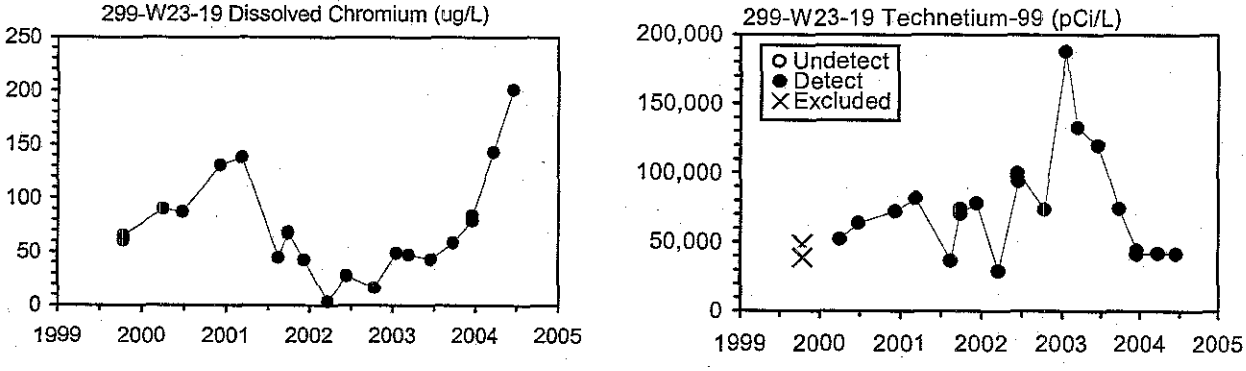


Figure 3. Chromium and Technetium-99 in Well 299-W23-19.

Concentrations of contaminants in regions of the plume downgradient of the source area continued to increase or remained at elevated levels. Of the three plume contaminants in well 299-W22-83, only chromium concentrations remained below the drinking water standard.

Data for well 299-W22-82 are used to provide an indication of plume spreading on its northern margin. Nitrate and technetium-99 concentrations increased to their highest levels ever for the well during the quarter (see Figure 4), with technetium-99 now above its 900 pCi/L drinking water standard for the first time in this well. These data indicate that the plume is slowing spreading to the north, as well as to the east.

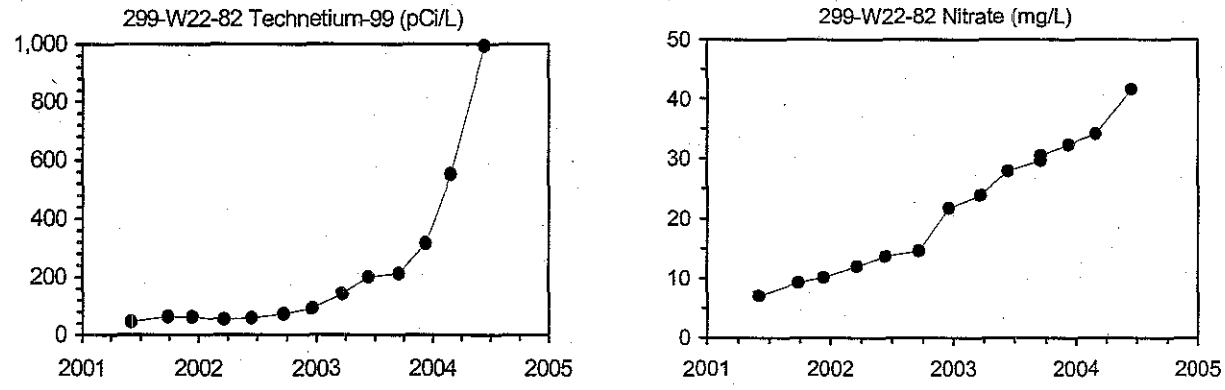
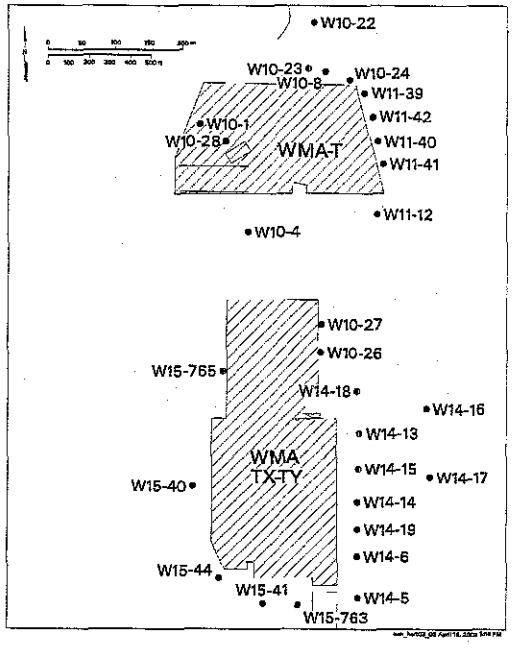


Figure 4. Technetium-99 and nitrate in well 299-W22-82.

In June, a special sampling test was conducted in well 299-W22-80, located on the southeast corner of the waste management area. The test involved pumping the well at approximately 11 liters per minute for a total of about 3,400 liters. A second pump, a bladder pump, was installed within 5 feet of the water table and pumped water at about 200 milliliters per minute. During the pumping, water samples were collected from both pumps every 30 minutes. The samples were analyzed for nitrate, chromium, and technetium-99. The results indicated that groundwater concentrations were higher in samples collected from the bladder pump and concentrations of samples collected from both pumps showed a development response with increasing concentrations with time.

Single-Shell Tank Waste Management Areas T and TX-TY: Water levels in wells near WMA T continued to decline during the reporting period. The measured amount of decline during the quarter was between 0.081 and 0.145 meter. Groundwater flow at WMA T is toward the east-northeast at a rate of about 0.001 meter per day.



Water level measurements in wells near WMA TX-TY showed between 0.029 and 0.804 meter decline in the water table during the reporting period. Declines greater that about 0.2 meter are not considered valid and are probably due to a combination of barometric effects and measurement error. The groundwater flow direction at WMA TX-TY varies from the north to the south part of the WMA. In the north, groundwater flow is east to southeast at a rate of about 0.01 to 0.025 meter per day. In the south, where groundwater flow has been greatly altered by the 200-ZP-1 pump and treat system, flow direction is to the south or south-southwest at about 0.3 meter per day.

All except one well in the monitoring networks at both WMA T and WMA TX-TY were successfully sampled during the second quarter of 2004. Well 299-W14-5, at WMA TX-TY, had insufficient water in the perforated interval for sampling. The well is considered dry.

WMA T

Chromium, carbon tetrachloride, and trichloroethene continued to be the only dangerous waste constituents found in the groundwater beneath WMA T. The source of the carbon tetrachloride and trichloroethene was liquid disposal associated with processes at the Plutonium Finishing Plant and not WMA T. Carbon tetrachloride and trichloroethene are monitored as part of the 200-ZP-1 Operable Unit. Nitrate and fluoride are also found in groundwater beneath the facility. In addition to the dangerous waste constituents, technetium-99 and tritium, non-RCRA-regulated constituents, are found in groundwater at the WMA.

Chromium concentrations continued to exceed the drinking water standard (100 μg/L) in four wells at WMA T in May 2004. The highest chromium concentration was in well 299-W10-4 located upgradient of the WMA. The concentration of chromium in this well was 436 μg/L, up from 386 μg/L during the previous quarter (Figure 5). Chromium concentrations have been increasing in this well since 1997. Well 299-W10-4 is located near the 216-T-36 crib, and that crib (or one of the cribs immediately west of the WMA) is the most likely source for the chromium.

Chromium in upgradient well 299-W10-28 exceeded the drinking water standard in May for the sixth straight quarter, with a concentration of 316 μg/L (see Figure 5). The chromium concentration during the previous quarter was 262 μg/L.

Chromium continued to exceed the drinking water standard in two downgradient wells in May: 299-W11-41 and 299-W11-42 (see Figure 5). The chromium concentrations increased slightly from the previous quarter's concentrations in well 299-W11-41 (157 μg/L) and well 299-W11-42 (162 μg/L). The source of the chromium in these wells is not known for certain but is not thought to be WMA T. Chromium in wells 299-W11-41 and 299-W11-42 could be from upgradient past practice disposal facilities such as the 216-T-36 crib and the 216-T-5 trench.

Nitrate concentrations remained above the 45 mg/L drinking water standard in all wells in the WMA T network during the reporting period. The highest reported concentrations of nitrate were in upgradient well 299-W10-4, where nitrate increased from 2,470 mg/L in February to 2,650 mg/L in May and in well 299-W10-28, where nitrate decreased slightly from 2,000 mg/L in February to 1,950 mg/L in May.

Nitrate concentrations in all downgradient monitoring wells at WMA T remained fairly level during the quarter. Concentrations in downgradient wells are between 88.5 mg/L (well 299-W11-39) and 863 mg/L (well 299-W11-42). Although a tank farm source for some of the nitrate in downgradient wells cannot be ruled out, most of the nitrate detected in wells at WMA T is believed to be from an upgradient source.

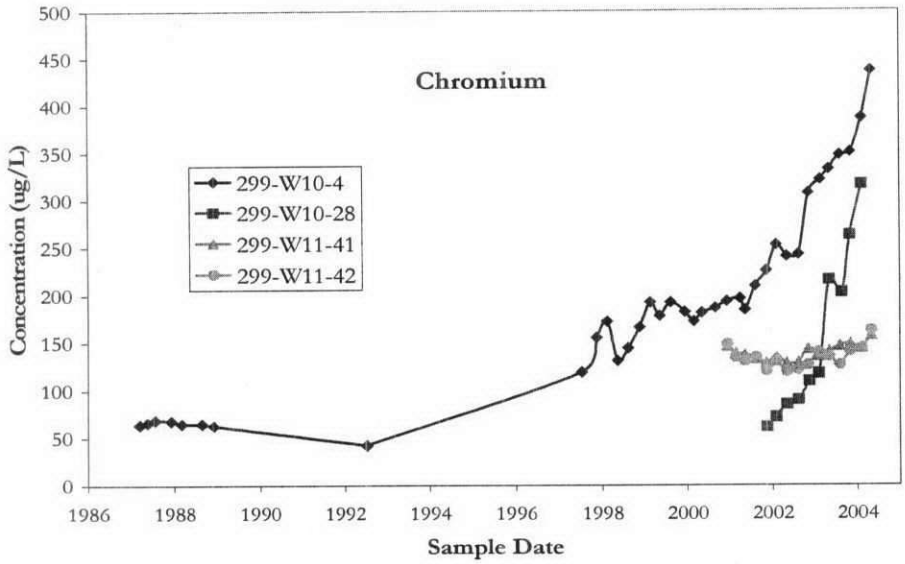


Figure 5. Chromium concentration in selected wells at WMA T. Wells 299-W10-4 and 299-W10-28 are upgradient wells; wells 299-W11-41 and 299-W11-42 are downgradient wells.

During the reporting period, the fluoride concentration in well 299-W10-8 exceeded the Washington State primary drinking water standard for fluoride (4 mg/L) with a concentration of 4.6 mg/L. The previous concentration of fluoride in the well was 3.3 mg/L. This is a substantial increase and the fluoride concentration will be closely monitored during the next quarter to verify that the current value is valid. Six other wells continued to exceed the secondary drinking water standard of 2 mg/L. These are 299-W10-4, located south of the WMA, 299-W10-23 and 299-W10-24, in the northeast corner of the WMA, and wells 299-W11-40, 299-W11-41, and 299-W11-42 east (downgradient) of the WMA.

Technetium-99 exceeded the 900 pCi/L drinking water standard in five downgradient wells at WMA T during May 2004 (Figure 6). The greatest concentration was 16,300 pCi/L in well 299-W11-39 which was up from 14,300 pCi/L during November 2003. The other wells exceeding the technetium-99 standard were 299-W10-24 (1,230 pCi/L), 299-W11-40 (1,380 pCi/L), 299-W11-41 (3,490 pCi/L), and 299-W11-42 (2,370 pCi/L). Technetium-99 concentration decreased substantially in the northernmost well (299-W10-24) and increased slightly in the other three southern wells suggesting that technetium-99 contamination is spreading south along the eastern edge of the WMA. The plume is well defined laterally but its downgradient extent is not known. A far-field well is planned to be installed about 50 meters downgradient of well 299-W11-39 in 2005 to help define the eastern extent of the plume.

Tritium exceeded the drinking water standard of 20,000 pCi/L in two wells at WMA T during the reporting period. The tritium concentration was 51,000 pCi/L in well 299-W11-12 and has been decreasing slightly since the well was first regularly sampled for tritium in late 1998. The tritium concentration was 21,000 pCi/L in far-field well 299-W11-7.

Finally, the pH of the sample from well 299-W10-24 exceeded the drinking water standard of 8.5 with a value of 8.61 during May 2004. Samples from this well have a history of pH values greater than the standard and the reason for the exceedance is not known.

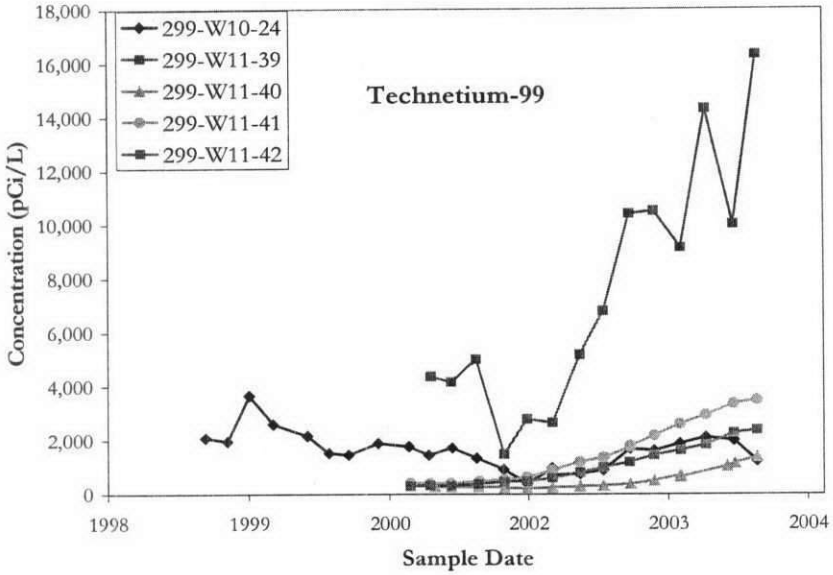


Figure 6. Technetium-99 Concentrations in Selected Wells Monitoring WMA T.

WMA TX-TY

Chromium, carbon tetrachloride, and trichloroethene continued to be the only dangerous waste constituents found in the groundwater beneath WMA TX-TY. The source of the carbon tetrachloride and trichloroethene was liquid disposal associated with processes at the Plutonium Finishing Plant and not WMA TX-TY. Carbon tetrachloride and trichloroethene are monitored as part of the 200-ZP-1 Operable Unit. Nitrate also is elevated in the groundwater beneath WMA TX-TY. In addition to the dangerous waste constituents, technetium-99, iodine-129, and tritium, all non-RCRA-regulated constituents, are found in groundwater at the WMA.

Chromium exceeded the 100 μg/L drinking water standard in one well at WMA TX-TY: 299-W14-13. The chromium concentration in that well was 669 and 647 μg/L in duplicate samples during the reporting quarter, similar to the 663 μg/L during the previous quarter. The chromium concentration had been increasing in the well since May 2001. The chromium plume is defined only by well 299-W14-13. The nearest wells to the north and downgradient of well 299-W14-13 had no detectable chromium, and the nearest well south of 299-W14-13 had 23 ug/L chromium in May 2004. The most likely source for the chromium at WMA TX-TY is the WMA itself or the nearby TY cribs.

Nitrate continued to exceed the drinking water standard (45 mg/L) in all wells in the WMA TX-TY monitoring network during the reporting quarter. The highest nitrate concentration was found in well 299-W14-13 in the central part of the east side of the WMA. The nitrate concentration in this well was 496 and 509 mg/L in May in duplicate samples. The nitrate concentration was 440 mg/L during the previous quarter. The regional nitrate plume at WMA TX-TY is attributed to past disposal practices throughout the 200 West Area. The relatively local high nitrate concentration at well 299-W14-13 may be due to one, or a combination of, nearby liquid disposal facilities and WMA TX-TY.

Manganese exceeded the secondary drinking water standard (50 µg/L) in well 299-W10-27 where the concentration was 145 µg/L in May 2004. This well has a history of high manganese concentration. The manganese concentration measured in August 2001, about 3 months after the well was drilled, was 862 µg/L. The manganese concentration has been decreasing since that time. The reason for the high manganese is not known.

Well 299-W14-13 is the only well at WMA TX-TY in which iodine-129 exceeds the 1 pCi/L drinking water standard; the May iodine-129 concentration in the well was 26.8 and 16.2 pCi/L in duplicate samples. The previous concentration was 24.8 pCi/L. Because of the large difference in concentration between the duplicate samples, a Request for Data Review was submitted to have the laboratory reanalyze both samples. There was insufficient sample left for one of the samples and the other gave a result of 25.9 pCi/L. The iodine-129 concentration in well 299-W14-13 has fluctuated between 17 and 50 pCi/L since the well was drilled in late 1998.

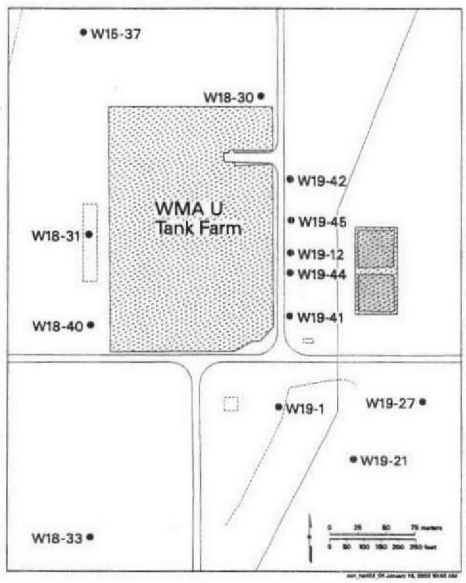
The concentration of technetium-99 was 8,460 and 8,630 pCi/L in duplicate samples from well 299-W14-13 during May 2004. This is similar to the 8,810 pCi/L in the well during February 2004. Technetium-99 concentration has been greater than the 900 pCi/L drinking water standard since the well was drilled in 1998. The technetium-99 plume is small and defined only by well 299-W14-13, although technetium-99 has been increasing in well 299-W14-18, north of 299-W14-13, since it was drilled in late 2001. Technetium-99 in well 299-W14-18 was ~550 pCi/L in May 2004. The nearest downgradient well to 299-W14-13 had 440 pCi/L in May and the nearest well to the south had 296 pCi/L, similar to most other wells on the east side of WMA TX-TY.

Tritium exceeded the 20,000 pCi/L drinking water standard in two downgradient wells at WMA TX-TY. The tritium concentration was 1,600,000 and 1,770,000 pCi/L in duplicate samples from well 299-W14-13 in May 2004. This is slightly less than 1,830,000 pCi/L found in the well in February 2004. Tritium in well 299-W14-15, located south of well 299-W14-13, was measured at 23,100 pCi/L in May 2004, similar to the previous quarter value of 22,700 pCi/L.

Aluminum concentrations exceeded the drinking water standard of 50 µg/L in several wells at WMA TX-TY. Anomalously high aluminum values have been found in several wells across the Hanford Site recently. The groundwater project's QC team is working with the analytical laboratory to resolve the aluminum issue.

Single-Shell Tank Waste Management Area U: This WMA, which has been in assessment monitoring since 1999, has affected groundwater quality with elevated concentrations of chromium, nitrate, and technetium-99. The impact has been limited to the southern half of the downgradient (east) side of the WMA. Carbon tetrachloride is also present beneath the WMA at concentrations above the drinking water standard in all monitoring wells in the network. The source of carbon tetrachloride is upgradient of the WMA.

The water table has continued to decline at a steady rate of approximately 0.3 meter per year; the gradient and flow direction are stable with the interpreted flow direction to the east. All water levels measured during the quarter were consistent with the trend of a falling water table.



All analytical results from groundwater samples collected in May were generally on trend.

A trend that is of note is the continued increasing technetium-99 concentrations in wells located on the northeast side of the WMA as observed in wells 299-W18-30 and 299-W19-42 (see Figure 7) as reported in the last quarterly report. This same trend has continued this quarter. While these concentrations are not high, the increasing trend for the past 3 or 4 quarters indicates a change. The increasing technetium-99 is not accompanied by a change in nitrate, which has remained at about 12 to 14 mg/L, in either well.

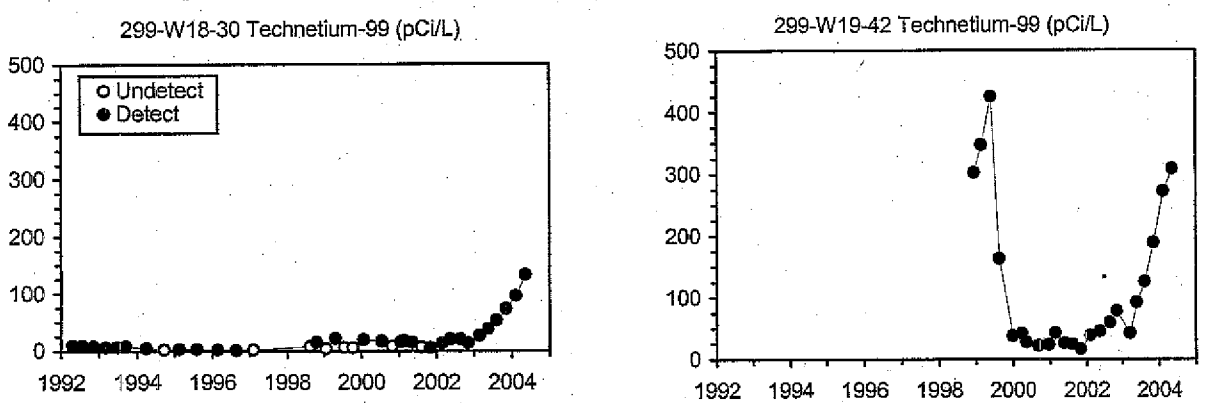
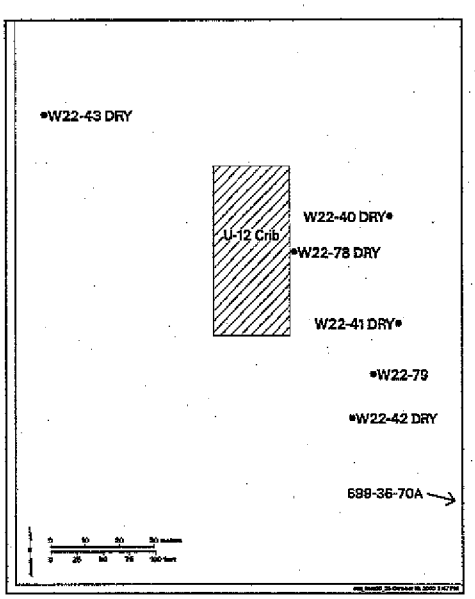


Figure 7. Technetium-99 in Wells 299-W18-30 and 299-W19-42.

During the current quarter, technetium-99 concentrations along the downgradient, eastern side of the waste management area are lowest in wells on the north and south ends of the line of wells, increasing to the mid-point at well 299-W19-12 where the highest concentration was 328 pCi/L, well below the drinking water standard of 900 pCi/L.

216-U-12 Crib: The current groundwater interim-status assessment monitoring network for the 216-U-12 Crib consists of only two downgradient wells (299-W22-79 and 699-36-70A). Both wells were sampled in June 2004. The site is in assessment for elevated specific conductance and the site-specific contaminant nitrate. In addition to data from the June sampling, anion results (nitrate) from the March sampling event are now available for well 699-36-70A.



A proposed final status closure/post-closure groundwater monitoring plan has been revised to address recent notice of deficiency comments received from Ecology. This proposed closure/post-closure groundwater monitoring plan provides an integrated semi-regional monitoring approach that would fulfill RCRA final status groundwater monitoring requirements. The groundwater monitoring described in this plan will be integrated into the CERCLA 200-UP-1 Operable Unit monitoring program after the closure of the 216-U-12 Crib which is scheduled to be closed under the CERCLA Accelerated U Area Waste Sites Closure.

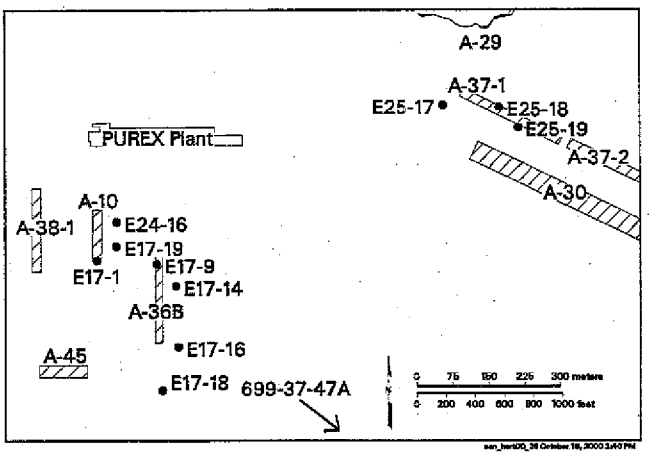
For downgradient well 299-W22-79, specific conductance and nitrate increased very slightly during the reporting quarter. Specific conductance was measured at 307µS/cm in June. Nitrate increased from 43.2 to 45.2 mg/L between March and June, increasing above the 45 mg/L drinking water standard. All other data results are declining, on trend, and/or below the drinking water standard.

For well 699-36-70A, specific conductance and nitrate also increased. Specific conductance increased from 487 µS/cm in March to 511µS/cm in June. Nitrate increased from 66.4 mg/L to 84.1 mg/L between March and June, remaining above the drinking water standard. All other data results are declining, on trend, and/or below the drinking water standard.

There is currently no upgradient well available at this network.

The groundwater flow direction beneath the crib has remained relatively unchanged, toward the east-southeast. Without an upgradient well and additional downgradient wells it is difficult to assess flow direction but it is believed that the two wells still monitor releases from the 216-U-12 Crib. Water levels continue to decline as the regional water table drops.

PUREX Cribs (216-A-10, 216-A-36B, and 216-A-37-1): All 11 of the near-field network wells were sampled during the reporting quarter. Water levels were measured at each well at the time of sampling. Nitrate was the only RCRA-regulated constituent that continued to exceed its drinking water standard (45 mg/L) in one or more of the wells sampled. Radioactive constituents (not regulated under RCRA) exceeding drinking water standards included iodine-129, strontium-90, gross beta, and tritium. Gross alpha concentrations were found to be elevated and rising in one downgradient well.



Beneath the PUREX Cribs, the differences in water table elevations from well to well are very small. Typically, the elevation difference between the lowest and highest levels is about 0.2 meter. During the reporting period the greatest water level difference was 0.23 meter (about 9 inches) over a distance of 850 meters for a maximum gradient of 0.0003. Therefore, the water table gradient is too low to determine groundwater flow rate or flow direction reliably. However, groundwater flow directions determined from the movement of groundwater contamination plumes indicate that the regional flow is toward the southeast.

Nitrate was reported at levels greater than the drinking water standard at four downgradient wells and one upgradient well (to the west) in the near-field well network. The highest concentration during the reporting period was 116 mg/L at well 299-E17-14, located near the 216-A-36B crib (Figure 8). At four of the five wells with elevated nitrate levels, the recent trend is upward.

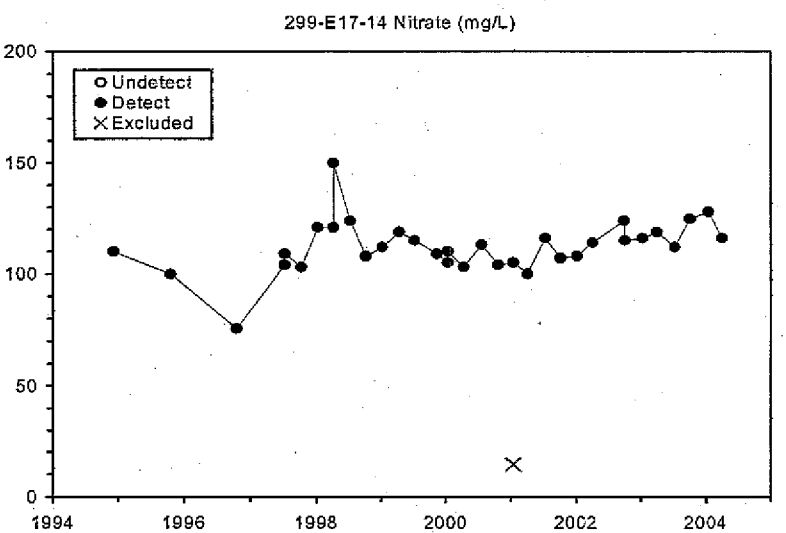


Figure 8. Nitrate at well 299-E17-14.

Iodine-129 was detected at six of the nine downgradient wells and one upgradient well. The detection level was in the range of 1.06 to 2.02 pCi/L. The iodine-129 drinking water standard is 1.0 pCi/L. The highest reported

level was 9.86 pCi/L at well 299-E17-19, which is located near the 216-A-10 crib. In most wells where detected, the trend for iodine-129 is variable but overall either remaining elevated or declining slightly.

Gross beta and strontium-90 (a beta-emitter) remain elevated at well 299-E17-14. The reported level for gross beta during the reporting quarter was 63.1 pCi/L while strontium-90 was 16.5 pCi/L. Both show slightly upward trends since 2000. The reported level for gross beta is higher than would be accounted for by the strontium-90 (the ratio of gross beta to strontium-90 is about 2). The remainder of the gross beta is most likely technetium-99, another beta emitter.

Tritium exceeded its drinking water standard (20,000 pCi/L) in eight of the nine downgradient wells and one upgradient well. Four of the results exceeded the drinking water standard by more than a factor of 10. The highest reported level was 516,000 pCi/L at well 299-E17-14. In most wells where levels exceed the drinking water standard the trend is level to decreasing except for well 699-37-47A at the southeast corner of the 200 East Area. This well is farther downgradient than the other near-field wells and is most likely experiencing changing groundwater flow directions with the cessation of wastewater discharged at B Pond to the northeast. In past years the highest portions of the tritium plume may have flowed out of the 200 East Area south of the position of well 699-37-47A. More recently the flow direction may have shifted slightly more eastward toward the position of well 699-37-47A.

Gross alpha has been rising steadily at two of the PUREX Cribs (216-A-10 and 216-A-36B). One well at each of these cribs had a reported gross alpha level above 10 pCi/L. The drinking water standard for gross alpha is 15 pCi/L. At well 299-E24-16 near the 216-A-10 crib the reported value was 13.8 pCi/L (Figure 9). At well 299-E17-16 near the 216-A-36B crib the reported value was 10.4 pCi/L. The most likely groundwater constituent responsible for the elevated gross alpha is uranium. Currently, groundwater samples collected from the near-field PUREX Cribs well network are not analyzed for uranium. Gross alpha was used to screen for uranium. If the ratio of uranium (in g/L units) to gross alpha (in pCi/L units) is assumed to be about 1.6, then the concentration of uranium at well 299-E24-16 would be approximately 22 µg/L. The drinking water standard for uranium is 30 µg/L. In order to determine if the elevated levels of gross alpha at PUREX Cribs wells are caused by uranium, uranium will be analyzed in samples from wells near these two cribs in future sampling events.

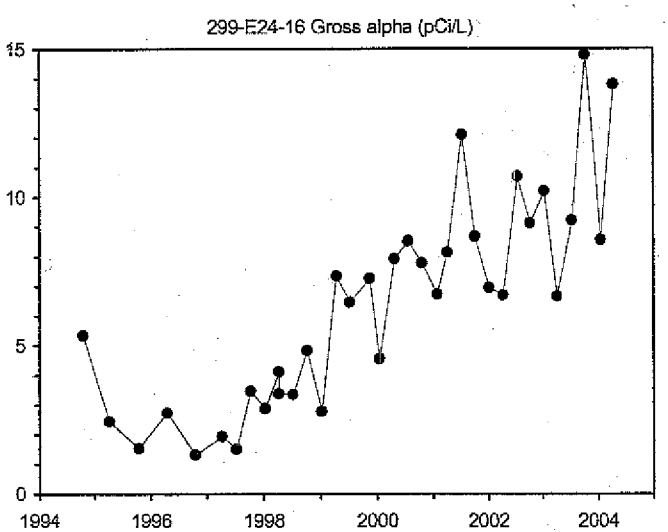


Figure 9. Gross alpha at well 299-E24-26.

Quality Control

Highlights of the groundwater project's quality control (QC) program for April-June 2004 are summarized below. We are transmitting a separate attachment with more specific QC information. The QC program indicated that most of the data were acceptable for use in the statistical comparisons discussed above. Data related to QC issues have been flagged in the database or are undergoing further review.

- Seventy-seven results were flagged with an H due to missed holding times. Coliform, nitrate and

nitrite account for most of the flagged results. In general, the data impacts should be minor.

- Most of the field duplicate results demonstrated good precision, although the relative percent differences for six pairs of results failed to meet the acceptance criteria. Fluoride, vanadium, iodine-129, and uranium were the constituents with out-of-limit results.
- Approximately 3% of the field blank results exceeded the QC limits. Most of the out-of-limit results were for total organic carbon, total organic halides, zinc, and methylene chloride. The field blank laboratory performance on the analysis of blind standards was good overall. Severn Trent St. Louis had one out-of-limit result for total organic halides, and Severn Trent Richland had two unacceptable results for plutonium-239. Lionville Laboratory had out-of-limit results for total organic carbon. All of the results from Eberline Services were acceptable.
- Performance-evaluation study results were available from one Water Pollution study, a Mixed Analyte Performance Evaluation Program study, and a Department of Energy Quality Assessment Program study this quarter. The majority of the labs' results were within the acceptance limits, indicating good performance overall.
- Approximately 98.5% of the laboratory QC results for this quarter were within the acceptance limits, suggesting that the analyses were in control and reliable data were generated. Parameters with more than one result that was significantly out of limits include method blanks for benzyl alcohol and diethylphthalate, laboratory control samples for trichloroethene; matrix spikes for nitrogen in nitrite, carbon tetrachloride, heptachlor epoxide, and technetium-99; and duplicates for acetone, ten phenols and uranium-235.

References

Furman, M. J., RL, to S. Leja, Ecology, "Notification of Specific Conductance Exceedance at Low-Level Waste Management Area 1 (218-E-10)," dated March 18, 1999 (CCN#067035).

Thompson, K. Michael, RL, to Jane Hedges, Ecology, "Notification of Specific Conductance Exceedances at the 216-A-29 Ditch," dated April 26, 2000 (00-GWVZ-038).

Williams BA, and CJ Chou. 2004. *Monitoring Plan for RCRA Groundwater Assessment at the 216-U-12 Crib* . PNNL-14301, Rev. 1 (draft - not yet published). Pacific Northwest National Laboratory, Richland, WA.